Information Bulletin

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Title: Contamination Control Design Parameters Exceeded

Date: December 6, 2006

Identifier: 2006-RL-HNF-0053

Lessons Learned Summary: When short term storage was extended longer then was originally planned the scope of the design output no longer satisfied the conditions present, falling outside of the material testing parameters. When changes are made to an initial work scope, design parameters associated with that work scope should be evaluated to determine if they may be exceeded and hazards must be re-evaluated to determine if additional hazard controls should be put in place.

Discussion of Activities: While moving Core Component Pots (CCP) from vertical short-term storage to horizontal long-term storage containers workers at Hanford's Fast Flux Test Facility observed a small amount of liquid dripping from the bottom of one of the double-bagged CCPs. Contamination surveys of the travel path between the two containers identified spots of beta-gamma contamination at levels between 4,000 disintegrations per minute per 100 square centimeters (dpm/100cm2) and 30,000 dpm/100cm2.

In preparation for draining sodium metal from the Intermediate Decay Storage Vessel (IDS) the CCPs had to be removed. After removing as much sodium as practical, the CCPs were withdrawn from IDS and allowed to cool so that the remaining sodium would solidify. After the sodium was solid the CCPs were double-bagged in bags made from polyurethane sheeting. The purpose of the bags was to contain contamination while the CCPs were placed in storage boxes.

The original plan was to cut the CCPs into two portions; storage boxes were procured to store the CCPs based on the lengths of the two segments. When the process to remove the CCPs from IDS was started it was discovered that the contamination levels on the CCPs were greater than anticipated and the cutting process would expose workers to unacceptable levels of radiation. The process was changed to delete the cutting step and to store the CCPs as one piece. This required the acquisition of longer storage boxes. While the longer storage boxes were being acquired and prepared, a short term vertical storage area was established so that removal of the CCPs from IDS could continue.

When the long term storage boxes were ready, the bagged CCPs were loaded directly into those boxes and were not placed in the vertical storage area. The CCPs in the vertical storage area were gradually moved to the long term storage boxes.

Analysis: Original planning for this activity involved bagging the CCPs for contamination control during direct transfer into the long term storage boxes. The bagging material was not to be relied upon for long term storage. The ester-based

polyurethane bagging material had previously been tested to determine its chemical compatibility with sodium and sodium hydroxide. The data showed that there was no discernable effect of sodium exposure or sodium hydroxide exposure on the strength or ductility of the polyurethane material. The testing was for sodium exposure up to 5 days and sodium hydroxide exposure up to 25 days. However, due to the changes in the process for preparing the CCPs for long term storage, some of the CCPs were placed into the vertical storage location for approximately two months.

Examination of the failed bagging material was not performed because of ALARA concerns due to the sodium hydroxide, the radiological dose rate, and the radiological contamination levels. The exact failure mechanism was not determined; however, the failure is believed to be due to reaction between the bagging material and sodium metal.

Recommendations: When changes are made to initial work scope, design parameters associated with that work scope should be evaluated to determine if they may be exceeded and hazards must be re-evaluated to determine if additional hazard controls should be put in place.

Cost Savings/Avoidance: Not evaluated

Work Function: Conduct of Operations/Work Planning

Hazards: Personal Injury/Exposure, Radiation/Contamination

Keywords: contamination control, containment barriers, work scope change, hazard control, chemical reaction, bagging, design parameters, sodium hydroxide

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References: Occurrence Report EM-RL-PHMC-FFTF-2006-0002

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